(b) Define the term torsional strain. Draw the potential energy level diagram of *n*-butane molecule by considering the rotation about C_2-C_3 bond.

(c) How will you differentiate between 2-butyne and 1-butyne? Write the chemical reaction involved.

(d) How will you convert 2-bromopropane into 1-propanol? Write the chemical reactions involved.

(4,4,4,3)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1006 **D**

Unique Paper Code : 2172541102

Name of the Paper : Fundamentals of Organic Chemistry, Stereochemistry and Hydrocarbons

Name of the Course : **B.Sc. in Analytical Chemistry**

Semester : I

Duration : 2 Hours Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **four** question in all.
3. Question No. **1** is compulsory.

1. (a) An alcohol A having molecular formula C_2H_6O, when treated with conc. H_2SO_4 gives an alkene B. When B is bubbled through bromine water (Br_2/H_2O) and the product obtained is

dehydrohalogenated with an excess of strong base sodamide a new compound C is obtained. Compound C is also obtained by reacting calcium carbide with water. Compound C gives D when treated with dilute H_2SO_4 in presence of $HgSO_4$. D can also be obtained by oxidising A using $KMnO_4$.

(i) Identify compounds A, B, C and D with a complete sequence of chemical reactions.

(ii) Write the mechanism of conversion of compound C to D.

(b) Carry out the following conversions :

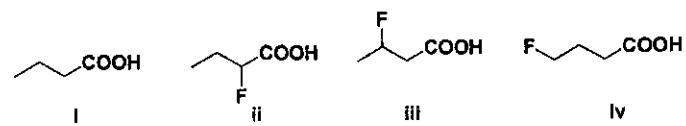
(i) Ethyne to 2-butyne and acetaldehyde

(ii) 2-Butyne to *cis*-2-butene and *trans*-2-butene

(iii) Ethane to *n*-butane

(c) Differentiate between configurational and conformational isomers by giving suitable examples.

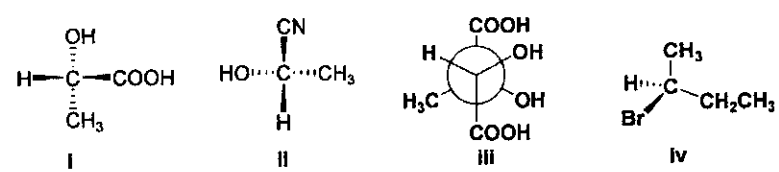
(d) What do you mean by inductive effect? Arrange the following carboxylic acids in the <u>*increasing order*</u> of their acidity strength.



I ii iii Iv

(4,4,4,3)

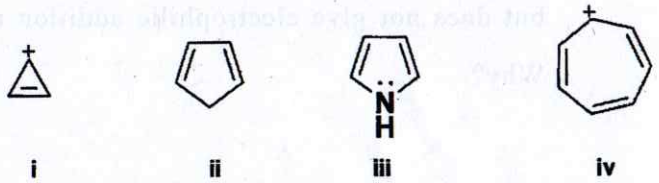
6. (a) Define the term chirality. Assign the R/S-nomenclature at the chiral centre(s) present in the following :



I II III Iv

P.T.O.

(c) What is Hückel's rule of aromaticity? Identity aromatic, anti-aromatic and non-aromatic compounds among the following, giving a suitable explanation.



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(d) Nitrobenzene is used as one of the preferred solvents to perform Friedel Craft's reaction. Explain. (4,4,4,3)

5. (a) Calculate the % yields of products formed during bromination of 2-methylpropane.

(b) How will you convert 2-bromopropane into 1-bromopropane? Give the mechanism of the reaction involved **(if any)**.

(iv) Benzene to isopropyl benzene (9,6)

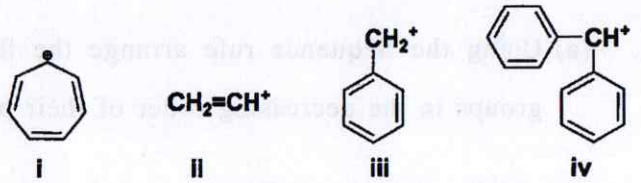
2. (a) Using the Sequence rule arrange the following groups in the decreasing order of their priority :

-CHO, $-COCH_3$, $-CH=CH_2$, $-C_6H_5$ and -OH

(b) How many stereoisomers are possible for 2,3-dibromobutane? Write their structures and give the correlation between them. How many of them are optically active and inactive? Assign R/S-nomenclature at each chiral carbon of **any one** of the optically active stereoisomers.

(c) Draw the structure of the most stable conformer of ethylene glycol and give suitable explanation.

(d) Arrange the following carbocations in the *increasing* order of their stability and give reason :



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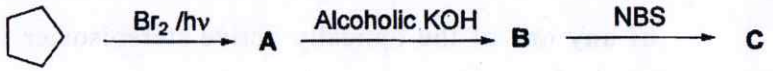
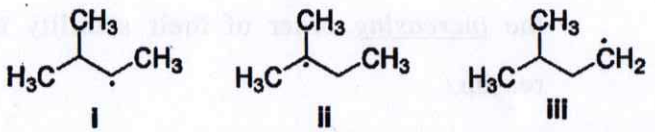
(4,4,4,3)

3. (a) Complete the following set of chemical reactions:



(b) Define hyperconjugation effect and arrange the following free radicals in the increasing order of their stability, giving a suitable reason.



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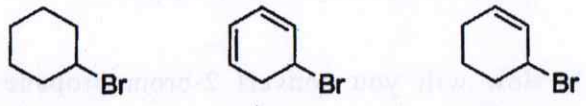
(c) How many geometrical isomers are possible for hexane-2,4-diene? Write their structures, assign E/Z-nomeclature in *each isomers* and write their IUPAC name.

(d) Benzene gives electrophilic substitution reaction but does not give electrophilic addition reaction. Why? (4,4,4,3)

4. (a) How to synthesize ethane by Kolbe's electrolytic method? Explain with mechanism.

(b) Arrange the following halogenated hydrocarbons in the decreasing order of their reactivity with sodium ethoxide in ethanol and give a suitable explanation.



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